AMENDMENTS TO THE CLAIMS

This Listing of Claims will replace all prior versions, and listings, of claims in the application:

1. (Currently amended) An~~A~~ ~~isolated~~ population of labeled oligonucleotide probes, each labeled oligonucleotide probe comprising an oligonucleotide associated with a series of detectably distinguishable signal molecules, the number and type of signal molecules identifying the nucleotide sequence of the probe, the number of probes in the population exceeding the number of unique signal molecules, wherein each probe is configured to bind to an oligonucleotide target, and the type of nucleotide at each position in at least one of the labeled oligonucleotide probes is configured to be identified by an intensity of at least one of the unique signal molecules.

2. (Original) The population of labeled oligonucleotide probes of claim 1, wherein each unique signal molecule is present up to 4 times per labeled oligonucleotide probe.

3. (Canceled)

4. (Canceled)

5. (Original) The population of labeled oligonucleotide probes of claim 1, wherein each labeled oligonucleotide probe comprises an intensity reference signal molecule.

6. (Original) The population of labeled oligonucleotide probes of claim 1, wherein each oligonucleotide is an identical length of about 10 to 50 nucleotides.

7. (Original) The population of labeled oligonucleotide probes of claim 1, wherein the signal molecules are Raman labels.

8. (Previously Presented) The population of labeled oligonucleotide probes of claim 7, wherein the series of signal molecules comprise a polymethine dye or a signal molecule selected from the group consisting of 2-Aminopurine, 2-Fluoroadenine, 4-Amino-pyrazolo[3,4-d]pyrimidine, 4-Pyridinecarboxaldoxime, 8-Azaadenine, Adenine, 4-Amino-3,5-di-2-pyridyl-4H-1,2,4-triazole, 6-(g,g-Dimethylallylamino)purine, Kinetin, N6-Benzoyladenine, Zeatin, 4-Amino-2,1,3-benzothiadia- zole, Acriflavine, Basic blue 3, Methylene Blue, 2-Mercapto-benzimidazole, 4-Amino-6-mercaptopyrazolo[3,4-d]pyrimidine, 6-Mercaptopurine, 8-Mercaptoadenine (adenine thiol), 9-Aminoacridine, Cyanine dyes, Ethidium bromide, Fluorescein, Rhodamine Green, and Rhodamine-6G.

9. (Original) The population of labeled oligonucleotide probes of claim 1, wherein the signal molecules are fluorescent labels or quantum dots.

10. (Original) The population of labeled oligonucleotide probes of claim 1, wherein the signal molecules are a series of nanotags.

11-23. (canceled)

24. (Currently amended) A reaction mixture, comprising a target polynucleotide and an isolated population of labeled probes, wherein each labeled probe comprises an oligonucleotide associated with a series of detectably distinguishable signal molecules, the nucleotide sequence of each oligonucleotide being represented by the number and type of signal molecules associated with the oligonucleotide, wherein the number of probes exceeds the number of unique signal molecules, wherein each probe is configured to bind to an oligonucleotide target, and the type of nucleotide at each position in at least one of the labeled probes is configured to be identified by an intensity of at least one of the unique signal molecules.

25. (Original) The reaction mixture of claim 24, wherein each unique signal molecule is present up to 4 times per labeled oligonucleotide probe.

26. (Canceled)

27. (Canceled)

28. (Original) The reaction mixture of claim 24, wherein each labeled oligonucleotide probe comprises an intensity reference signal molecule.

29. (Original) The reaction mixture of claim 24, wherein each oligonucleotide is an identical length of about 10 to 50 nucleotides.

30. (Original) The reaction mixture of claim 24, wherein the population of labeled oligonucleotide probes comprises all possible sequence combinations of an oligonucleotide of the identical length.

31. (Original) The reaction mixture of claim 24, wherein the signal molecules are Raman labels.

32. (Previously Presented) The reaction mixture of claim 31, wherein the series of signal molecules comprise a polymethine dye or a signal molecule selected from the group consisting of 2-Aminopurine, 2-Fluoroadenine, 4-Amino-pyrazolo[3,4-d]pyrimidine, 4-Pyridinecarboxaldoxime, 8-Azaadenine, Adenine, 4-Amino-3,5-di-2-pyridyl-4H-1,2,4-triazole, 6-(g,g-Dimethylallylamino)purine, Kinetin, N6-Benzoyladenine, Zeatin, 4-Amino-2,1,3-benzothiadiazole, Acriflavine, Basic blue 3, Methylene Blue, 2-Mercapto-benzimidazole, 4-Amino-6-mercaptopyrazolo[3,4-d]pyrimidine, 6-Mercaptopurine, 8-Mercaptoadenine (adenine thiol), 9-Aminoacridine, Cyanine dyes, Ethidium bromide, Fluorescein, Rhodamine Green, and Rhodamine-6G.

33. (Original) The reaction mixture of claim 24, wherein the signal molecules are fluorescent labels.

34. (Original) The reaction mixture of claim 24, wherein the signal molecules are a series of nanotags.

35. (Currently amended) The population of labeled oligonucleotide probes of claim 1, wherein a location of a peak in a response spectra of a sample comprising the labeled oligonucleotide probes indicates the presence of a particular labeled oligonucleotide probe while the ~~size~~ intensity of the peak is proportional to the number of ~~the~~a particular labeled oligonucleotide probe.

36. (Currently amended) The reaction mixture of claim 24, wherein a location of a peak in a response spectra of a sample comprising the labeled oligonucleotide probes indicates the presence of a particular labeled oligonucleotide probe while the ~~size~~intensity of the peak is proportional to ~~the~~ a number of the particular labeled oligonucleotide probe.

37. (Previously Presented) The population of labeled oligonucleotide probes of claim 1, wherein each signal molecule is assigned to encode a subunit of a template polynucleotide.

38. (Previously Presented) The reaction mixture of claim 24, wherein each signal molecule is assigned to encode a subunit of a template polynucleotide.

39. (New) The population of labeled oligonucleotide probes of claim 1, wherein each labeled oligonucleotide probe comprises a single strand.

40. (New) The population of labeled oligonucleotide probes of claim 1, wherein the labeled oligonucleotide probes are not immobilized.

41. (New) The population of labeled oligonucleotide probes of claim 1, wherein each labeled oligonucleotide probe further comprises two or more linkers that link two or more signal molecules and the probe.

42. (New) The population of labeled oligonucleotide probes of claim 1, wherein the labeled oligonucleotide probes comprise two or more labels and the series of detectably distinguishable signal molecules are divided among the two or more labels, the two or more labels attached at different positions on the probe.

43. (New) The population of labeled oligonucleotide probes of claim 1, wherein the series of detectably distinguishable signal molecules comprises a number of different signal molecules, the number of different signal molecules equal to the number of labeled bases in the labeled oligonucleotide probes.

44. (New) The reaction mixture of claim 24, wherein each labeled oligonucleotide probe comprises a single strand.

45. (New) The reaction mixture of claim 24, wherein the labeled oligonucleotide probes are not immobilized.

46. (New) The reaction mixture of claim 24, wherein each labeled probe further comprises two or more linkers that link two or more signal molecules and the probe.

47. (New) The reaction mixture of claim 24, wherein the labeled oligonucleotide probes comprise two or more labels and the series of detectably distinguishable signal molecules are divided among the two or more labels, the two or more labels attached at different positions on the probe.

48. (New) The reaction mixture of claim 24, wherein the series of detectably distinguishable signal molecules comprises a number of different signal molecules, the number of different signal molecules equal to the number of labeled bases in the labeled oligonucleotide probes.